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METEOROLOGY AT THE INVENTIONS EXHIBITION.

IT is perfectly obvious—has been proved before—that annual exhibitions are a mistake. That millions of persons go to the Inventions Exhibition proves nothing, except the need for well-regulated places of amusement, with plenty of light, air, shelter, food, and music. That by the addition thereto of an infusion of Royalty, by low railway fares and by plenty of advertising, a big profit can be made, nobody need deny; but, presumably and professedly, higher objects are aimed at. In meteorology they certainly are not obtained. An Inventions Exhibition, with no exhibit from Casella, Negretti and Zambra, or Richard, is as fine a specimen of Hamlet with the Ghost left out, as could possibly be arranged. We said last year that "The day has not yet come when scientific instruments are considered worthy of as good a position as a wax model of a big turnip," and doubtless the poor place assigned to their exhibits last year has induced the firms we have named, and others, to stop away entirely. We think that they consulted their own dignity by so doing.

There is, however, quite sufficient to occupy a morning, and the majority of the instruments are, this year, placed in an excellent position, a marked contrast to their cemetery last year. We will take them according to their numbers in the catalogue, and mention also their locality, but the numbers are in some places very irregularly placed, and our readers must hunt them up for themselves. We shall only mention exhibits which contain somewhat unusual objects. The letters D, G, S, B under the numbers denote that the Diploma, Gold, Silver or Bronze Medal has been awarded for the articles mentioned.

EAST AVENUE.

1052. **Hollands, S. H.** *Aero-Dynamometer; a machine designed to gauge relative wind pressure, vertically and horizontally, on inclined aeroplanes, at various inclinations and velocities.* This model is among the aeronautical apparatus, but is worthy of examination by those interested in anemometers.

EAST ARCADE.

1364. B **Gray, J. W. & Son.**—*Lightning conductors.*—A thoroughly good exhibit; the best factory chimney protector that we have ever seen.

1378. B **Rogers, Francis M.**—*Electrical weather* (!) *vane* for showing within the house position of wind.*—Ordinary vane on short iron shaft, vane carries a contact maker; wire connects with indicator in any desired position. This instrument resembles Yeates's (2185), but gives only direction, not as theirs does, direction and velocity.

1398. **Brailsford, T. R.**—*Electrical rain gauge and register.*

SOUTH CENTRAL GALLERY.

2126. **Beck, R. & J.**—*New model barometers.*—The novelty is limited to the upholstery, *i.e.* they are ordinary pedestal barometers, but the wooden frames are carved columns, Corinthian, Ionic, &c., and there are aneroids with landscapes as a background.

2130. G **Lege A. & Co.**—*Self-registering barometer. Self-registering anemometers.*—These form parts of perhaps the best tide gauge we have yet seen; they are not designed to give absolutely perfect records of the meteorological elements, but to give all that can be required for the determination of tidal constants. The barometer is a syphon, mercurial with float, which by a watch chain raises or lowers a light frame carrying a pencil which usually is not in contact with the paper, but is driven against it once each hour by a tapper. The anemometer is a small size Beckley, recording on the same sheet, so that the level of water, direction and velocity of wind, and barometric pressure are all marked on one sheet driven by one clock.

2133. **Baker, C.**—*Aneroid barometer.*—About 4½ in. in diameter, with lens, and stated to be capable of measuring an altitude of one foot.

2145. S **Denton, S. G.**—*Unalterable thermometers.*—Mr. Denton, not only again shows the thermometers for which he gained the medal at the Health Exhibition but he contributes two important statements.

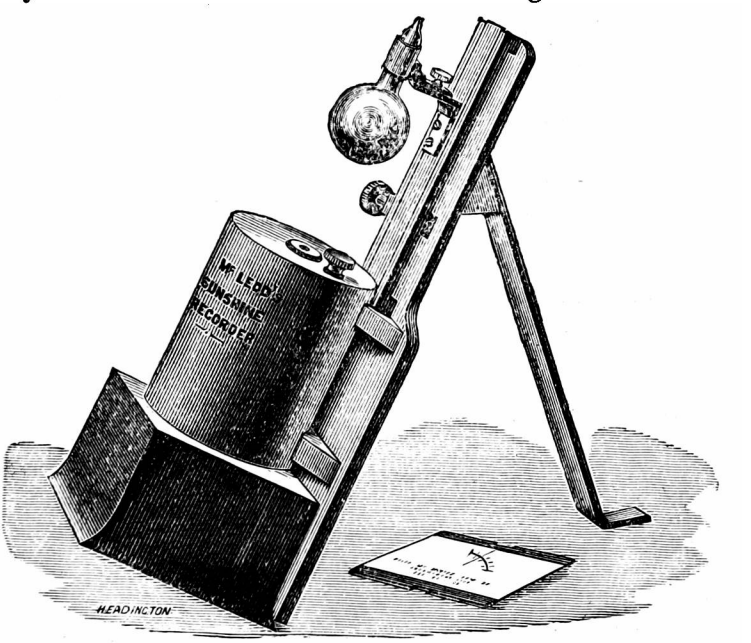
(1) He explains the process by which he has achieved this remarkable result—the most important in thermometry for a quarter of a century:—"I construct the thermometers with supplementary chambers, so that they will bear heating to over 150° F. above the highest point that they are intended to be used at. I then subject them to this extra temperature in heated oil for three weeks." (2) Mr. Denton announces that the rise in zero point with which we used to

* *Weather* cock has come down from remote ages, and must be submitted to; if vane requires another word it should evidently be *wind* vane.

be troubled is not due, as was always stated, to contraction of the tube, but to expansion of the mercury. And in support of this statement he mentions that (*a*) he blew 24 thermometer tubes, exhausted them, hermetically sealed them, and left them in hot oil for three weeks; (*b*) he filled them all with mercury, and divided them into two lots of 12 each; 12 were re-heated and have remained unaltered; 12 were not re-heated, and have risen about as much as is usual.

2160. **Hicks, J. J.**

G *New Sunshine Recorder*, invented by Professor McLeod, F.R.S. The annexed engraving gives an excellent idea of this instrument, and it is only necessary for us to explain very briefly the mode of action. The bottle-shaped object at the top is a spherical mirror; when the instrument has been properly placed, *i.e.* with its axis parallel with that of the earth and its face due south, the sun's rays falling on the spherical mirror will be reflected down on to the small lens in the top of the cylindrical box, and will pass on to the square box at the bottom. In this is placed a frame holding a sheet of ferro-prussiate paper on which the actinic rays fix a trace whenever the sun is shining.



Improved Anemoscope, by G. M. Whipple, B.Sc.—This has been engraved and described in the *Quar. Jour. R. Met. Soc.*, Vol. XI., p. 64. The object is to prevent the errors which sometimes arise from the foreshortening of the vane when nearly in the line of sight. This is effected by making the vane turn the ordinary letters N.E.S.W., and by fixing rigidly,

at right angles to the line of sight, a pointer; it is then only necessary to notice what letter or letters are nearest to the pointer in order to read off the direction.

Standard Thermometers, with fixed zeros that will not alter; heated by Hicks' Patent Process.—We are not responsible for this title, which is at any rate long enough. How a fixed zero *could* alter we do not know. At any rate we have here a second process closely resembling Denton's, and time alone will show whether it is equal, or inferior, to his. We do not see that it is possible for it to be better.

Solar Radiation Thermometers in vacuo, with very minute bulbs, the bore being magnified about twelve times.—This is a very useful application of what is known as "lens front" tubes. The size of the bulb of a thermometer regulates its sensitiveness, therefore the smaller the bulb the more sensitive, but a very small bulb necessitates a very fine bore, and then the thermometer is hard to read. By the above process the thread is magnified and made very legible, while the bulb is unusually small.

Patent enamel water gauges.—Mr. Hicks has patented the making of rain gauge and other measures in opal glass, except where the divisions are engraved, which is left transparent. We have not used one, and cannot express any opinion on the plan.

The catalogue says nothing of some *Six's Max. and Min. Thermometers*; from a meteorological stand point this is as well, but as specimens of glass blowing they are well worthy of attention.

2174. S **Latham, Baldwin, C.E.**—*Recording Rain Gauge.*—Three photographs of this gauge, for description of which see *British Rainfall*, 1878, p. 48.

2175. G **Stanley, W. F.**—*Radiation thermometer.*—Described in *Quar. Jour. R. Met. Soc.*, Vol. XI. p. 124. *Meteorologist's Rule.* See *Quar. Jour. R. Met. Soc.*, Vol. X., p. 303.

2178. S **Immisch, M.**—*Metallic thermometer for clinical and ordinary purposes.*

This is a very carefully made portable thermometer. It is, in fact, the smallest accurate thermometer which we have yet seen. Its motive power consists of a very fine Bourdon tube (*i.e.*, a microscopic edition of those used in Richard's thermographs), which causes the hand to traverse the silvered dial. The engraving is exactly the size of the complete instrument, and we may add that it weighs less than one-third of an ounce. If any one desires to make a pretty and useful present, here is an excellent chance.

2180. D **Kew Committee of the Royal Society.**—*Photo-nephograph or cloud height measuring apparatus.*—The apparatus itself is not shown, but a small model of it and several of the twin photographs which have been obtained. The apparatus consists of two small photographic cameras, the shutters of which can be opened or closed by electric current, and therefore simultaneously; the cameras are placed at a known distance apart and they are pointed approximately at any well marked feature of a cloud, and then simultaneous photographs are taken in each camera, and from these photographs the altitude and azimuth of the cloud can be accurately determined.

2183. **Adie, P.**—Mr. Adie says nothing about them in the Catalogue, but he shows some *barometers* which appear to sustain his high reputation for those instruments; we may mention as very successful an attempt at so mounting an accurate instrument as to render it suitable for ordinary hall use.

2185. S **Yeates & Son.**—*Electrical rain gauge.*—This was shown at the Scientific Loan Exhibition in 1876, and fully described, with a whole page engraving, in Vol. XI., p. 153, of this Magazine. *Electrical anemometer.* Robinson's cups and a windmill governor on an iron pillar, electric contact makers attached to each, and a compact registering apparatus for placing indoors.

2204. D **Physical Society of London** (Collective exhibit by the members).

Stanley, W. F.—*Barometrical and Thermometrical clocks for registering mean atmospheric pressure and temperature.* See *Quar. Jour. R. Met. Soc.*, Vol. III., p. 352.

Bailey, W.—*Integrating anemometer.* (See *Philosophical Magazine*, June, 1884, p. 483.)

Guthrie, Prof.—*Turbid thermometers.*—These are not at all intended for meteorological use, but as the idea is entirely new to us, and it is not at all certain that it may not be applied to meteorological purposes, we devote a few lines to it. Mixtures of triethylamine and water according to the proportions of each are perfectly transparent at low temperatures, but turbid at high ones. Prof. Guthrie has blown a set of nine small thermometer-like tubes and bulbs, has partly filled each with mixtures of the two liquids in varying proportion, and finds that they become turbid respectively at the following very different temperatures:—68°·3, 69°·4, 76°·1, 79°·9, 91°·4, 98°·6, 105°·2, 111°·2, and 123°·8.

Guthrie, Prof.—*Spiral cistern barometer.*—As this instrument, in its present form, stands no chance of ever being

employed in meteorology, it is needless to do more than record its presence, and say that, as its name implies, it is a syphon barometer with a horizontal spiral of tube between the long and the short column.

IN GARDEN WEST OF GREAT FOUNTAIN.

2207. **Curzon, H.**—*Manifest Rain and Dew Gauge, denotes* 1½ *in. of rainfall at a glance, in degrees of* $\frac{1}{100}$*th of an inch, first degree protracted and sub-divided for dew, &c. Compressible rubber tube within glass as safeguard against fracture by frost.*—A square 10 inch funnel (with too flat a rim) leading to a receiver perhaps 4 inches square by 18 inches deep; from the bottom of it a diagonal tube arises at an angle of about 20°, just as in Steinmetz's Vaporimeter*, the vertical depth of rain is therefore doubly increased, (*a*) by the funnel being perhaps six times the area of the receiver, and (*b*) by the diagonal tube, which perhaps multiplies it threefold, making the total scale perhaps 18 times the natural one; this is about twice as open as the jar of an ordinary 5 inch gauge, but we infinitely prefer our old friend, the Snowdon. One great, in fact fatal, objection to this gauge is its small capacity—it will hold only 1½ inches, and had it been in use in Norfolk and Suffolk last year, every record would have been spoiled unless the observers happened to have gone and emptied it during the rain. We have other objections to it, but do not think it needful to set them out.—*Curzon's Bascule Rain and Dew gauge, holds* 1½ *in. of rain, denotes* 80 *degrees* [*i.e.* 0·80 in.] *at a glance, remainder to be poured into a jug or returned for measurement, and two quantities added together. Compressible tube within glass tube.*—If anything, this is less fitted for practical work than the other.

IN GARDEN EAST OF GREAT FOUNTAIN.

2208. D **Royal Meteorological Society.**—*Typical Climatological Station.*—The above title is self-explanatory, and it is only necessary to add that the instruments were supplied by Messrs. Negretti & Zambra, and that a trained observer attends at each hour during the day to give any desired explanation. The instruments are too close together, but more space could not be obtained.

SOUTH CENTRAL GALLERY.

2251. **Green, C. & Fuidge, L. V.**—*Actinometer.*—This is for photographic not for meteorological purposes; but we are not sure that Total Illumination is not quite as important an element of climate as Total Bright Sunshine, and if so, this exhibit is suggestive.

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* Steinmetz, A. "Sunshine and Showers," 1867, p. 142.

2235A. S **Jordan, J. B.**—*Sunshine recorders, Second pattern.*—These were not in the early editions of the Catalogue, and they have no number. A short description, with engraving of the first pattern, is given on p. 38 of this volume.

EAST CENTRAL GALLERIES.

2652. **Voss, R.**—*New improved patent hygroscopes.*—We feel rather inclined to contend that two out of these four words are incorrect, as is also the label on the stand which describes them as "Mithoff's metallic spiral" hygroscopes because they are mounted in metal cases. They *seem* to be made of a strip of parchment coiled round an axle which carries the hand on the dial, and they are in mountings much resembling 4-inch aneroids.

2739. G **Rung, Captain G.**—*Patent rain gauge.*—Fully described and engraved in *British Rainfall*, 1884, page 22. We are very glad, however, to find that the engraving in the *Meteorologische Zeitschrift* had misled us in more than one respect. The funnel at the Inventions Exhibition is quite a reasonable one, out of which neither hail nor snow would ordinarily get; we should, however, prefer the rim being a little stiffer. Captain Rung has been good enough to explain that the instruments of this type erected by the Danish Meteorological Institute are placed in small boxes in the open field, with the funnels 6 ft. 2 in. above the ground; we wish they had been 3 ft., the Government would then get for £17 what the English Meteorological Council paid more than twice that sum for, but neither the engraving in the *Zeitschrift*, nor the mounting at South Kensington, suggests such a possibility; if Captain Rung had sent a photograph of one *in situ* the mistake would have been impossible. Lastly, we learn that the suddenness of the fly back to zero is prevented by a perforated partition in the buckets; this also is not shown in the engraving. We congratulate Captain Rung on his instrument, but we certainly owe no thanks to his engraver.

Patent self-recording barometer.—This, though differing in nearly every respect, puts us in mind of Redier's barograph. We hope on a future occasion to give full details and engravings, but in the interim may state that it is a syphon mercurial barometer, attached to the short arm of a lever working on knife edges, the barometer being counterpoised by a weight running on rollers along the long arm of the lever. This weight is moved along the balance by a nut travelling on a screw actuated by a train of clockwork. When the movement of the mercury in the tube alters the position of the centre of gravity, a detent attached to the

end of the long arm starts the train of clockwork in one direction or the other until equilibrium is re-established. The nut carries an ink bottle and pen, which makes a trace on a sheet of paper kept in motion by a clock.

THE DROUGHT OF JULY, 1885.

As promised in our last number, we insert letters from nineteen of our correspondents on the drought of July, but owing to their large number, we have been reluctantly compelled to abridge some of them, and rigorously suppress everything not bearing directly upon the subject of the drought. We hope our correspondents will recognise the necessity for so doing, and accept our apologies for the unavoidable excision of a considerable amount of the very interesting matter with which they have favoured us.

Several of the July records mentioned in the following letters are less than a quarter of an inch, and one is less than a tenth of an inch; several also are almost as remarkable for their deficiency as compared with the average, and with the smallest amounts recorded in previous months. Up to the present time, Coventry (Coundon) heads the list of the smallest records with ·03 in., as printed in the Supplementary Table for July, and that Table shows one ... owing to correspondence with the observer at Hailsham, whose record for the month was so large (1·63 in.) that we thought some mistake had been made. In reply we received an interesting account of a TS which occurred on the afternoon of Sunday, 5th, yielding 1·32 in. of R, and we are sorry that want of space prevents its insertion.

To the Editor of the Meteorological Magazine.

SIR,—After 72 days drought with only ·47 in. of R at Benenden and ·56 in. here on 16 days with no fall exceeding ·07 in., we had TSS this afternoon, yielding ·19 in. I can find no other such dry period since I began to observe in 1863.—Yours truly,

Tenterden, August 20th, 1885. J. ELLIS MACE.

SIR,—We had only ·15 in. of R last month at Keston, but the springs after all are not yet so bad as last year at this time.—Yours truly,

Keston, August 20th, 1885. G. BUCHANAN.

SIR,—The rainfall (11·36 in.) of the first six months of 1885 exceeded that of the first half of any year since 1879, as well as the mean of the 17 years, 1868-1884; but during the following month the rainfall (·28 in.) was not only less than in any previous July, but less than in any one month during the preceding 17½ years through which my record extends. The total fall during the 56 days from June 10th to August 4th, both included, was only ·59 in. The bed of the river Ravensbourne has for several weeks been perfectly dry from above Bromley down to the springs below Shortlands and Southend (Lewisham), and continues so even after the

heavy R of the last few days. Among the peculiarities of the season may be noted the general scarcity of insects, especially butterflies, and the total absence of wasps and the usually destructive gooseberry grubs.—Yours faithfully, PERCY BICKNELL.

Foxgrove, Beckenham, August 8th, 1885.

SIR,—The rainfall here for July was ·77 in., being 1·07 in. below the average of the previous 18 years—but according to the 10 years 1870-79, it was ·92 in. below the average.—Yours truly,

Worthing, August 5th, 1885. W. J. HARRIS.

SIR,—The drought began on Wednesday, 24th of June, at 7 p.m., and has just terminated—August 6th, at 5 p.m.—a period of 43 days less 2 hours, during which time only ·25 in. of R fell.—Yours faithfully, H. GARRETT.

Highfield, Southampton, August 6th, 1885.

SIR,—The rainfall here for July was only ·12 in., which is nearly as small as any you quoted in the *Times*. On looking over my late father's rain record during the 34 years the record had been kept, I could find no single month during which so small an amount had been registered.—Yours faithfully, F. C. CLUTTERBUCK.

Long Wittenham, Abingdon, August 10th, 1885.

SIR,—The month of July has passed with a rainfall of only ·14 in. The average of the last 16 years, 1870-1885 inclusive, is 2·93 in. The nearest approach was July, 1878, ·52 in., and July, 1876, ·68 in. —Yours faithfully, R. LITTLEBOY.

Newport Pagnell, July 31st, 1885.

SIR,—I have read with much interest your letter in to-day's *Times*, with reports of the July rainfall from various stations. As my gauge registered even less than the minimum quoted in your letter, I venture to trouble you with the figures :—July 15th, ·01 in.; 18th, ·04 in. ; 19th, ·01 in. ; total for July, ·06 in. With these exceptions we had not a drop of R from June 25th to August 3rd ; since then, half an inch has fallen in 2 days.—Yours faithfully, T. E. COBB.

Cotefield, Bodicote, Banbury, August 5th, 1885.

SIR,—The drought has continued over 51 days, since June 10th, during which time only ·45 in. of R has fallen. During July I recorded only ·39 in., and ·18 in. of this fell on 12th.—Yours truly,

St. Cuthbert's, Southend, August 1st, 1885. C. J. HOLTHOUSE.

SIR,—The months of July and August this year having been very, not to say remarkably, dry here, I have thought it might be useful to place the fact on record as far as this place was concerned. I have, therefore, prepared the enclosed table showing the days and times at which I observed the difference of readings of the dry and wet bulb thermometers to be such as would give a relative humidity below 40, together with the general direction and force of the wind.

The 17th August was as dry as, or drier than, the 26th July (of which I sent you particulars), though the difference of dry and wet

bulbs was not so great, but then the temperature was 8° or 9° lower. —Yours very truly, R. H. BARNES.

Heatherlands, Parkstone, September 2nd, 1885.

1885.		Dry Bulb.	Wet Bulb.	Dew Point.	Relative Humidity.	1885.		Dry Bulb.	Wet Bulb.	Dew Point.	Relative Humidity.
Day.	Hour.					Day.	Hour.				
	p.m.						p.m.				
July 12	3.40	70·2	55·5	44·2	39	Aug. 17	1. 0	78·9	61·5	49·5	36
,, 26	1. 0	87·1	70·1	59·2	39	,, ,,	1.30	78·0	60·3	48·0	35
,, ,,	1.25	86·4	67·5	55·3	35	,, ,,	2. 0	79·3	61·7	49·6	36
,, ,,	2.15	88·0	69·5	57·7	36	,, ,,	2.30	79·6	62·2	50·3	36
,, ,,	3. 0	86·7	69·1	57·7	38	,, ,,	3. 0	79·4	62·5	50·9	37

July 12th..... Wind W. to N.
,, 26th..... ,, N.N.E. and S.S.W.
August 17th ... ,, N.W. to N.

SIR,—I have recorded here from January 1st to June 30th 16·09 in. of R, but only ·16 in. fell (on 3 days) in July, and although there have been local showers amounting here to 1·39 in. this month, all springs, ponds, streams, and reservoirs are lower than I have previously known them to be during my 20 years residence here.—Yours faithfully, R. H. LIPSCOMB.

E. Budleigh, Budleigh Salterton, August 26th, 1885.

SIR,—The rainfall here for last month was much less than at Okehampton or Holsworthy, as per your letter in yesterday's *Times*, viz., ·78 in. No R fell on the last 5 days of June, or on the first 4 days of this month (August), so that the ·78 in. for July is really the total fall for 40 days.—Yours truly, R. SANDERS.

Heale House, Littleham, Bideford, August 6th, 1885.

SIR,—Rain occurred here on only 6 days in July, measuring ·64 in., the greater part of which (·45 in.) fell on 18th. The average for the month for the past 17 years is 3·27 in., so that we have had 2·63 in. below the average for that period.—Yours truly, R. GORTON.

Cirencester, August 4th, 1885.

SIR,—From the 25th of June to the 4th of August, 39 days, the rainfall at Beckford was only ·13 in., viz., July 7th, ·03 in.; 18th, ·07 in.; 19th, ·02 in.; 21st, ·01 in.; total, ·13 in. Notwithstanding this long period with such a small amount of R. it has not been an absolute drought (14 days without R) according to your definition of that term in *British Rainfall*, 1884, but only a partial drought.—Yours truly,

Beckford, Tewkesbury, August 12th, 1885. F. SLADE.

SIR,—There were some rather remarkable results from the observations of my four stations last month (July). Downton gauge (my own) showed ·57 in., and the heaviest fall ·19 in., on 7 days. At Gwyrn-i-Aglwydd, just across the Radnor forest, there fell in the

month 1·41 in., with a heavest fall of ·81 in. on the 4th. This fall was only a slight shower of ·04 in. at Downton, and was not shown at all at Ednol, where 1·02 in. fell during the month, and where the heaviest fall was only ·28 in.; while at Pen-y-bont there fell only ·50 in. in the month, with ·14 in. as a heaviest fall. The Gwyrn-i-Aglwydd storm did not appear there at all. These stations are about 5 miles distant from each other on the different sides of the forest.—Yours very truly, E. PEARSON.

Downton, Kington, August 18th, 1885.

SIR,—I saw your letter as to the spring rainfall lately in the *Times*. Here we had in April, May, and June, 1884, 4·92 in. of R; in April, May, and June, 1885, 8·94 in.; in July, 1885, ·12 in. only. The result has been, in this immediate neighbourhood, the best crop of grass ever known and the best harvested.—Yours truly,

Waresley, Hartlebury, Kidderminster, Aug. 10th, 1885. J. WATSON.

SIR,—Between June 25th and August 3rd the rainfall here was only ·06 in. On August 6th, 1·91 in. fell, chiefly between 7 and 10 at night. We had almost constant T during that time, and although an inch of R in 24 hours generally causes a flood here, so dry was the land that the river has scarcely perceptibly risen.—Yours faithfully,

Rotherby Hall, Leicester, August 7th, 1885. J. HAMER.

SIR,—The rainfall during the month of July (·42 in.) has been remarkably small, being 2·20 in. less than the average for that month for 18 years. During that period there have only been three months with less rainfall, viz., January, 1880, ·18 in., June, 1868, ·27 in., and July, 1868, ·33 in. In the last mentioned year there was a very early and abundant corn harvest.—Yours faithfully, W. WESTON.

Eastwood, near Nottingham, August 4th, 1885.

SIR,—Our rainfall this year has been as follows:—From January to June 13·26 in., as against 10·68 in. the average for 27 years; July, ·57 in., as against an average of 2·33 in. You will thus see that we had a large excess in the first six months, and a large deficiency in July, but still insufficient to bring the total fall to the average. July was remarkable for its absence of TSS, but on August 6th we had warmer weather, followed by a TS during the night of 6-7th, during which ·55 in. of R fell, very nearly as much as the total fall of July.—Yours truly, HAROLD SMITH.

Hull, August 7th, 1885.

Leon Brault.

WE regret to record the death, at the early age of 47, of Captain Brault, Director of the Meteorological Branch of the Depôt des Cartes et Plans, Paris—an appointment analogous to that held in England by Captain Toynbee, and to that of our hydrographic office. Mr. Brault's excellent wind charts had already rendered great service to navigation, and he was engaged in their further improvement when he was taken from us.

LIGHTNING AND LUMINOUS CLOUDS ON AUGUST 6TH.

To the Editor of the Meteorological Magazine.

SIR,—Is it, or is it not, a common occurrence to see lightning rise from the ground to the cloud? On Thursday night last, between half-past nine and half-past ten, we had the grandest display of electricity that I have ever seen; distance, 14 to 31 seconds, or I suppose three to six miles. Twice my daughter and I saw distinctly streams of electricity rise from the ground to the cloud, and another, to me, curious phase was that *several* times a brilliant flash, occurring at the lower edge of a rising ground, extended upwards to the top, and then all along the edge to as far as trees, close to, allowed us to follow it in one continued line of vivid light.

The storm was in front, and on two sides of where we were, that is from nearly E. round by S. to S.W.

I certainly never saw any display of lightning so extensive or so vivid. One flash, I suppose nearer to me than the rest, so dazzled me that I could not read at all that evening.

F. GARTSIDE TIPPINGE.

Sansaw, Shrewsbury, August 9th, 1885.

[As regards "upstrokes" they are less often seen than downstrokes, but do occur from time to time. Some electricians say that every flash is double, and starts simultaneously from earth and cloud, but unless our eyes, and all the photographs of lightning flashes, are wrong, that theory is incorrect. Our impression is that upstrokes are rare, but that when they do occur they are very violent.

As regards the luminosity of a length of country, it is curious that Prof. Colladon, of Geneva, observed on the same night that "a long black cloud, stretching from the Dôle to the Galène, presented on each side a broad phosphorescent border, and about 9.15 p.m. there became suddenly visible in that part of the cloud nearest the Jura a luminous centre, whence escaped two or three phosphorescent rays pointing to the S.W."—ED.]

LIGHTNING STRUCK OAKS AT RICHMOND, SURREY.

During the thunderstorm of August 6th, two oaks near the White Lodge in Richmond Park were struck by lightning. The occurrence was described in a letter to the *Times*, inserted on September 5th, and as portions of that letter have been reprinted in *Nature*, *The English Mechanic*, and other papers, it is only necessary here to state that good photographs of the damage can be obtained from Mr. A. Seeley, The Ferns, Onslow Road, Richmond.

SUPPLEMENTARY TABLE OF RAINFALL, AUGUST, 1885.

[For the Counties, Latitudes, and Longitudes of most of these Stations, see *Met. Mag.*, Vol. XIV., pp. 10 & 11.]

Div.	STATION.	Total Rain.	Div.	STATION.	Total Rain.
		in.			in.
II.	Dorking, Abinger	·77	XI.	Rhayader, Nantgwillt..	3·03
,,	Margate, Birchington...	·56	,,	Carno, Tybrith	3·45
,,	Littlehampton	·30	,,	Corwen, Rhug	1·96
,,	Hailsham	·82	,,	Port Madoc	2·64
,,	I. of W., St. Lawrence.	·40	,,	I. of Man, Douglas	2·02
,,	Alton, Ashdell.....	1·22	XII.	Stoneykirk, Ardwell Ho.	2·07
III.	Winslow, Addington ...	2·50	,,	Melrose, Abbey Gate...	2·26
,,	Oxford, Magdalen Col...	1·66	XIII.	N. Esk Res. [Penicuick]	2·35
,,	Northampton	2·19	XIV.	Ayr, Cassillis House ...	...
,,	Cambridge, Beech Ho...	1·27	,,	Glasgow, Queen's Park.	2·52
,,	Wisbech, Bank House..	1·43	XV.	Islay, Gruinart School..	1·52
IV.	Southend	·40	XVI.	St. Andrews, Newton Bk.	2·39
,,	Harlow, Sheering	1·06	,,	Balquhidder, Stronvar..	5·51
,,	Rendlesham Hall	1·00	,,	Dunkeld, Inver Braan..	3·77
,,	Diss	1·25	,,	Dalnaspidal H.R.S. ...	4·43
,,	Swaffham	1·34	XVII.	Keith H.R.S.	3·42
V.	Salisbury, Alderbury...	·82	..	Forres H.R.S.	2·90
,,	Warminster	1·72	XVIII.	Strome Ferry H.R.S....	2·37
,,	Calne, Compton Bassett	2·18	,,	Lochbroom	1·48
,,	Ashburton, Holne Vic..	2·73	,,	Tain, Springfield.....	1·05
,,	Holsworthy, Clawton...	1·81	,,	Loch Shiel, Glenaladale	4·37
,,	Hatherleigh, Winsford.	1·28	,,	Invergarry	1 60
,,	Lynmouth, Glenthorne.	1·65	XIX.	Lairg H.R.S.	...
,,	Probus, Lamellyn	2·31	,,	Forsinard H.R.S.	1·50
,,	Wincanton, Stowell Rec.	2·37	,,	Watten H.R.S.	1·51
,,	Wells, Westbury.....	1·85	XX.	Dunmanway, Coolkelure	4·79
VI.	Bristol, Clifton	2·32	,,	Fermoy, Gas Works ...	3·42
,,	Ross	1·95	,,	Tralee, Castlemorris ...	2·27
,,	Wem, Sansaw Hall.....	2·01	,,	Tipperary, Henry Street	3·93
,,	Cheadle, The Heath Ho.	1·97	,,	Newcastle West	3·08
,,	Worcester, Diglis Lock	2·53	,,	Miltown Malbay.....	2·14
,,	Coventry, Coundon	2·82	,,	Corofin	...
VII.	Melton, Coston	...	XXI.	Carlow, Browne's Hill..	2·29
,,	Ketton Hall [Stamford]	3·71	,,	Navan, Balrath	2·60
,,	Horncastle, Bucknall ...	2·46	,,	Mullingar, Belvedere ...	3·71
,,	Mansfield, St. John's St	2·41	,,	Athlone, Twyford	3·13
VIII.	Macclesfield, The Park.	...	XXII.	Galway, Queen's Col....	2·98
,,	Walton-on-the-Hill.....	2·10	,,	Clifden, Kylemore	4·48
,,	Lancaster, South Road.	3·08	,,	Crossmolina, Enniscoe..	3·04
,,	Broughton-in-Furness ..	...	,,	Carrick-on-Shannon ...	1·80
IX.	Wakefield, Stanley Vic.	1·09	XXIII.	Dowra	...
,,	Ripon, Mickley	2·39	,,	Rockcorry.....	...
,,	Scarborough.....	2·27	,,	Warrenpoint	2·74
,,	East Layton [Darlington]	1·69	,,	Newtownards	2·66
,,	Middleton, Mickleton ..	1·42	,,	Belfast, New Barnsley .	2·67
X.	Haltwhistle, Unthank..	2·98	,,	Cushendun	2·94
,,	Shap, Copy Hill	3·21	,,	Bushmills	1·32
XI.	Llanfrechfa Grange	2·43	,,	Stewartstown	2·13
,,	Llandovery	2·61	,,	Buncrana	2·18
,,	Castle Malgwyn	2·39			

AUGUST, 1885.

Div.		STATIONS. [The Roman numerals denote the division of the Annual Tables to which each station belongs.]	RAINFALL. Total Fall.	Difference from average 1870–9	Greatest Fall in 24 hours. Dpth	Date.	Days on which ·01 or more fell.	TEMPERATURE. Max. Deg.	Date	Min. Deg	Date	No. of Nights below 32°. In shade.	On grass.
			inches	inches.	in.								
I.	ENGLAND.	London (Camden Square) ...	·85	— 1·89	·25	26	12	79·3	17	43·3	14	0	0
II.		Maidstone (Hunton Court)...	·73	— 1·51	·18	26	11	...	...	...	...	...	...
,,		Strathfield Turgiss	·90	— 1·52	·32	8	6	79·4	17	43·8	23	0	0
III.		Hitchin	2·39	+ ·11	·40	12	11	70·0	17	39·0	13*a*	0	...
,,		Banbury	2·75	+ ·05	·60	27	14	74·0	16	37·0	14	0	...
IV.		Bury St. Edmunds (Culford)	2·29	+ ·12	1·31	5	7	75·0	10*b*	35·0	13	0	...
,,		Norwich (Cossey)	·64	— 1·98	·16	20	8	75·0	10*c*	37·0	15	0	1
V.		Weymouth(LangtonHerring)	1·04	...	·40	26	11	...	...	...	...	...	...
,,		Barnstaple	1·05	— 3·05	·36	6	10	79·0	27	45·0	4	0	...
,,		Bodmin	2·64	— 2·20	·72	6	12	74·0	19*d*	45·0	15	0	0
VI.		Stroud (Upfield)	2·50	— ·67	·55	26	13	75·0	10*e*	42·0	13*f*	0	...
,,		ChurchStretton(Woolstaston)	3·52	— ·56	1·81	4	13	72·0	16*g*	44·0	14*h*	0	0
,,		Tenbury (Orleton)	2·87	— ·85	1·18	4	11	78·5	17	33·3	14	0	1
VII.		Leicester	2·98	...	·82	6	15	76·0	25	40·5	15	0	3
,,		Boston	1·26	— 1·35	·44	7	9	82·0	25	42·0	14*c*	0	...
,,		Grimsby (Killingholme).....	2·29	— ·63	·71	20	10	71·5	10	41·0	14	0	...
,,		Hesley Hall [Tickhill].....	1·39	...	·33	6	8	76·0	16	36·0	15	0	0
VIII.		Manchester (Ardwick).....	1·66	— 2·26	·54	12	13	70·0	1*i*	43·0	14*j*	0	...
IX.		Wetherby (Ribston Hall) ...	1·30	— 1·33	·51	7	6	...	...	...	...	...	...
,,		Skipton (Arncliffe)	3·39	— 2·41	·95	12	12	72·0	16	35·0	13	0	...
X.		North Shields	3·55	+ ·46	1·91	5	12	71·5	10	38·5	14*f*	0	0
,,		Borrowdale (Seathwaite).....	8·36	— 2·68	3·25	10	10	73·8	1	35·2	30	0	...
XI.	WALES.	Cardiff (Ely).....	2·79	— 2·54	·72	6	12	...	...	...	...	...	...
,,		Haverfordwest	3·00	— 1·97	·92	9	12	72·2	2	38·5	4	0	0
,,		Plinlimmon (Cwmsymlog) ...	2·71	...	·56	9	10	...	...	...	...	...	...
,,		Llandudno.....	·91	— 2·28	·18	5	10	69·0	9	44·0	15	0	...
XII.	SCOTLAND.	Cargen [Dumfries]	3·49	— ·78	·74	9	10	74·2	1	35·0	30	0	...
,,		Jedburgh (Sunnyside).....	1·47	— 1·90	·46	12	9	70·0	1	35·0	30	0	0
XIV.		Douglas Castle (Newmains)	5·59	+ 1·29	1·80	3	10	...	...	...	...	...	...
XV.		Lochgilphead (Kilmory).....	3·79	— 1·43	1·17	12	10	...	...	...	...	...	...
,,		Oban (Craigvarren)	2·10	...	·66	10	10	70·5	19	42·6	27	0	...
,,		Mull (Quinish).....	1·92	...	·43	9	9	...	...	...	...	...	...
XVI.		Loch Leven Sluices	3·10	— ·98	1·10	8	8	...	...	...	...	...	...
,,		Arbroath	1·52	— 1·81	·40	9	9	71·0	21	39·0	14	0	...
XVII.		Braemar	4·96	+ ·53	3·44	12	12	73·0	1	29·1	31	1	5
,,		Aberdeen	2·02	...	·92	12	16	70·0	16	33·0	30*k*	0	...
XVIII		Skye (Sligachan)	...	...	...	...	...	...	...	...	...	...	...
,,		Culloden	1·89	— 1·11	...	...	...	69·0	1	33·0	31	0	5
XIX.		Dunrobin	...	...	...	...	...	...	...	...	...	...	...
,,		Orkney (Sandwick).....	1·68	— 1·22	·58	10	16	62·5	9	...	...	...	...
XX.	IRELAND.	Cork (Blackrock).....	4·46	+ ·63	1·37	27	13	88·0	17	40·0	20	0	...
,,		Dromore Castle	2·98	...	1·00	8	10	77·0	20	45·0	23	0	...
,,		Waterford (Brook Lodge) ...	4·63	...	·77	27	13	75·0	18	40·5	20	0	1
,,		Killaloe	3·46	...	·93	27	13	77·0	1, 2	40·0	14	0	...
XXI.		Portarlington	2·63	— ·44	·51	6	15	78·0	1	39·0	14	0	...
,,		Dublin (FitzWilliam Square)	3·05	— ·13	1·72	4	14	71·4	17	41·2	14	0	0
XXII.		Ballinasloe	2·38	— 1·65	·72	30	11	72·0	1	33·0	14	0	...
XXIII		Waringstown	1·44	— 2·00	·51	5	12	82·0	1	40·0	13	0	0
,,		Londonderry (Creggan Res.).	2·18	...	·64	12	13	...	...	...	...	...	...
,,		Omagh (Edenfel)	1·44	— 2·21	·27	5	13	75·0	1	40·0	13	0	..

a And 14. *b* And 16, 17, 25. *c* And 15. *d* And 20. *e* And 16, 25. *f* And 30. *g* And 25.
h And 15, 30. *i* And 10, 16, 24. *j* And 15, 19. *k* And 31.
+ Shows that the fall was above the average; — that it was below it.

METEOROLOGICAL NOTES ON AUGUST.

ABBREVIATIONS.—Bar. for Barometer; Ther. for Thermometer; Max. for Maximum; Min for Minimum; T for Thunder; L for Lightning; T S for Thunderstorm; R for Rain; H for Hail S for Snow.

ENGLAND.

STRATHFIELD TURGISS.—Altogether a very fine and dry month, though the nights were cold, prolonging the later harvest. Hops in this county an almost total failure; autumn growth of grass checked by the cool temperature; keep scarce; root crops unfavourable; potatoes not so good as last year; hay crop very good; no T or L all the month.

HITCHEN.—The coldest August on record.

BANBURY.—A rather favourable month for harvest work, but R too late to be of much use to grain; crops hardly so good as was expected. Mean temp., 55°·9; TSS on 6th; H on 7th; high wind on 12th and 28th.

COSSEY.—A cold, dry month, the temp. rose to 70° on only five days; wheat harvest commenced on 10th, and all corn was secured by 31st.

LANGTON HERRING.—Another very dry month, rainfall 1·69 in. below the average of ten years; from June 25th to August 25th inclusive (62 days) the rainfall was only ·54 in., the average for the corresponding 62 days of ten years being 5·16 in. Mean temp. more than 2° below the average of 13 years, and the lowest for August in that period. Distant T on 6th, 7th, and 23rd, but no TS here this summer; heavy dew on 25th; high wind on 26th.

BODMIN.—Magnificent weather during the whole month. Mean temp., 59°·8.

STROUD.—Unsettled weather till 12th, and cold towards the end of the month. L on 6th, TS on 7th, high wind from S.W. from 8th to 12th.

WOOLSTASTON.—A favourable month for the harvest; mean temp., 55°·8. The rainfall of the 4th was the heaviest recorded here during 20 years. T and L on 6th.

ORLETON.—With the exception of a few days about the 16th, the temp. was uniformly low with a prevalence of cold, clear nights and fine days. Mean temp. nearly 4°·5 below the average of 24 years, and more than 2° lower than that of 1862, the lowest in that period; pressure generally high and steady; prevailing winds N. and E.; prolonged TS and ·58 in. of R on 6th; frost on grass on 14th.

LEICESTER.—Cold for the time of year; TS on 5th; TS with H on 6th.

KILLINGHOLME.—The month was cold, owing to the prevalence of polar winds; moderate rains saved the root crops and did not injure the corn; harvest made rapid progress, but wheat did not yield according to promise. T and L on 6th and 7th; distant T on 12th.

MANCHESTER.—The month although fine on the whole was remarkably cold; a few miles from Manchester there were frosts on two separate occasions during the month, and even at Ardwick, which is well within the influence of the city, the temp. was on three occasions as low as 43°; only one slight TS.

SEATHWAITE.—Stormy on 9th and 10th, with 5·42 in. of R in the two days.

WALES.

HAVERFORDWEST.—The weather continued fine and warm until the 6th, on which day the air was cold early (wind S.E.), and large masses of rocky cumulus were aggregating. About noon the appearance was very threatening, a bank of cloud of intense blackness extending from E N.E. to N.W.; this developed into a circular storm of great intensity, with very vivid forked L of a remarkably fine rose colour. In this immediate neighbourhood the storm culminated about 7 p.m., when a terrific flash of rose-coloured L occurred, followed by a deafening peal of T, and ·50 in. of R in half an hour. Broken weather prevailed from 11th to 13th, from which date to the end of the month it was warm and fine. A grand harvest month, splendid corn crops, green crops also very good. Mean temp. below average, 70° being reached on only six days.

LLANDUDNO.—A dry and bright month, but owing probably to the prevalence of polar winds, particularly towards the end of the month, the mean temp. was no less than 3°·8 below the average; the monthly range 6°·1, and the daily range 2°·9, were also below the average; 173 hours of bright sunshine were recorded.

SCOTLAND.

CARGEN.—Mean temp. 3°·6 below the average; the coldest summer observed here for 25 years, the mean temp. of the months May, June, July, and August being 3°·1 below the average. Most of the corn was cut in this district by the end of the month; T and L on 6th and 7th; gale on 10th.

JEDBURGH.—The month was marked by cold E. and N.E. winds, and a total absence of R during the latter half. Potato crop so far remarkably good and free from all disease; cutting of grain crops quite general during the latter half of the month; barley above the average, oats an average crop; springs and rivers remarkably low; great absence of sunshine.

KILMORY.—The weather was remarkable for the alternation in character of both temperature and wind. The heat of the sun on the afternoon of 21st was extraordinary, indeed during the latter half of the month the amount of sunshine was such as is very unusual in this locality. Barley and some oats cut, and harvest will be general at the beginning of September. Heavy R (·97 in.), and strong S.S.E. wind on 10th.

QUINISH. — Frost on night of 27th, blackening potatoes and French beans.

BRAEMAR.—A dry but very cold month, with prevalent E. wind. On the night of the 12th the mountains were covered almost to their base with S, this not having been seen before in August by the oldest inhabitant; 3·44 in. of R fell here on that day, the heaviest fall recorded during 29 years' observations.

ABERDEEN.—Fine month; rainfall below the average.

CULLODEN.—Very dry, with temp. below the average; the grass temp. falling on the night of the 31st to 25°·2; the potato crop considerably damaged.

IRELAND.

BLACKROCK.—1st and 2nd fine, then showery to 12th, followed by very fine and often hot weather to 25th, then showery to the end. It is notable that twice in the month more than an inch of R fell in 24 hours, which very seldom occurs here in any one month, viz., 1·36 on 8th, and 1·37 on 27th.

DROMORE.—The month was everything that could be desired.

WATERFORD.—Rainfall ·88 in. above the average of 25 years; T on 4th and 5th; S.W. gale on 9th and 10th; fog on 16th, 25th and 26th.

KILLALOE.—With some heavy showers in the first and closing weeks of the month, a period of fully a fortnight of brilliant weather enabled hay harvesting to be finished in fine condition.

DUBLIN.—A very cool, changeable month, and an unusual preponderance of winds from "polar" quarters. More than half the rainfall (56 per cent.) was measured on 4th, and the rainy days were only 14, compared with an average of 15·5. There was H on 4th and 12th, and electrical disturbances occurred near Dublin on 4th and 7th. The atmosphere was foggy on 24th, 25th and 26th, and frequently hazy during the latter part of the month. Mean temp. 55°·9, 3°·0 below the average of 20 years, and lower than that of any August in that period, the nearest approach being in 1881, when the mean temp. was 56°·0. Mean humidity, 83; prevailing winds, E.N.E. and N.

WARINGSTOWN.—The R of the first and second weeks, though it did much. good, was insufficient to affect pastures to any great extent, and during the last fortnight the grass was much burned up, and a water famine was imminent.

EDENFEL.—Another "old-fashioned" summer month, calm, generally clear and occasionally hot, with a rainfall considerably less than half the average. The somewhat remarkable sequel of a late harvest has followed this charming summer, and even now (September 4th) five-sixths of the cereals are unreaped, and the potato haulm is quite as green as ordinarily in July, and the tubers more free from disease than in any year since 1845.